Hour Exam #1 (AM)
Chemistry 343
Professor Gellman
5 October 2011

Last Name _____

First Name _____

00251

General Instructions:

(i) Use scratch paper at back of exam to work out answers; final answers must be recorded at the proper place on the exam itself for credit. Models are allowed.

(ii) Print your name on each page.

(iii) Please keep your paper covered and your eyes on your own work. Misconduct will lead to failure in the course.

1. (15 points) Draw a structure that corresponds to each of the following names. Show all atoms in each structure, including hydrogen atoms.

(a) 2-chloroheptane

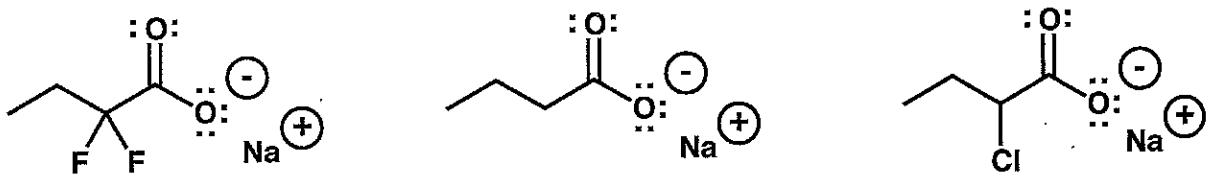
(b) *Z*-3-bromo-3-nonene

(c) cyclopentyl-cyclohexane

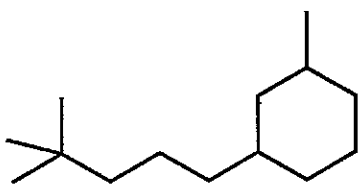
Name _____

2. (14 points) For each set of structures shown below, redraw the structures in the order of DECREASING basicity, left to right. (Note: Negative charges are balanced by a sodium (Na) counterion (positive charge).)

(a) CH_3NH_2 CH_3OH CH_3NH^- Na^+

(b) 

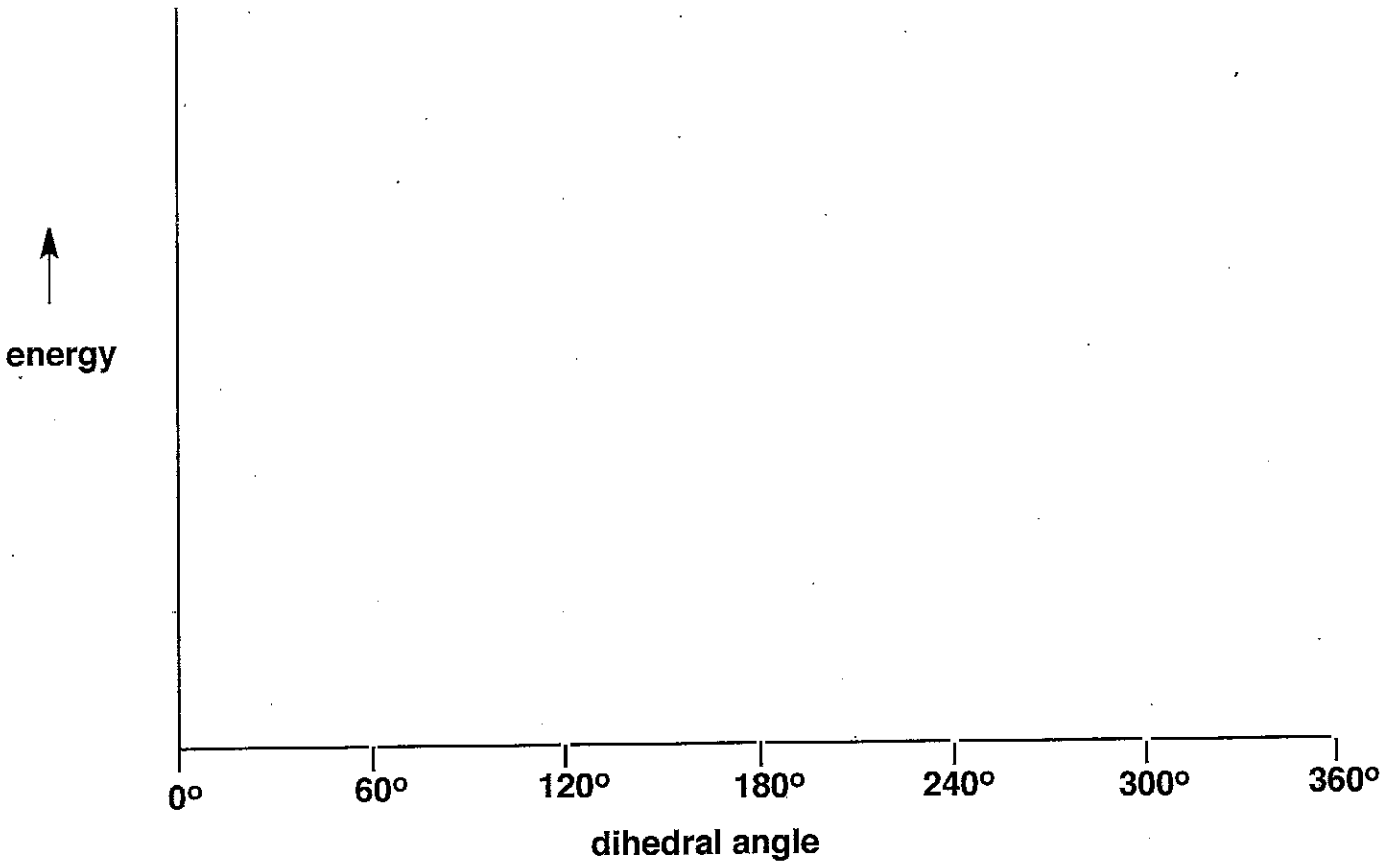
3. (7 points) On the structure shown below, indicate for EACH CARBON ATOM whether that atom is 1°, 2°, 3° or 4°.



4. (20 points)

(a) Shown below is 1,1,1-tribromopentane; draw the energy diagram for rotation about the bond between carbon-1 and carbon-2. Provide an appropriate drawing to identify at least one maximum and at least one minimum in this energy function.

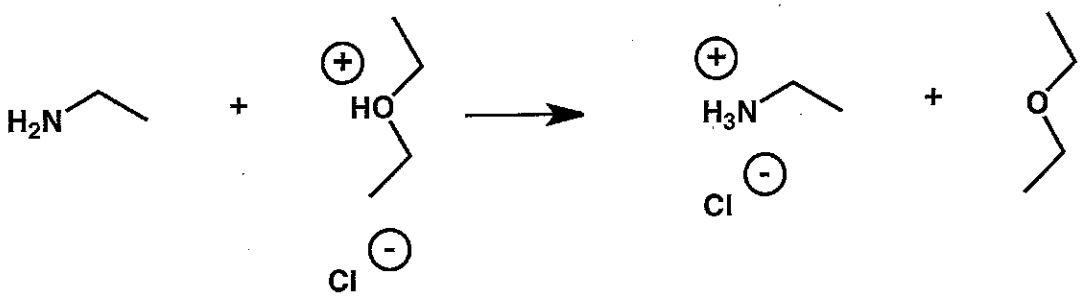
$CBr_3CH_2CH_2CH_2CH_3$



(b) Draw a Newman projection of the most stable conformation about the bond between carbon-2 and carbon-3.

Name _____

5. (14 points) Provide a mechanism (curved arrows) for the reaction shown below. Show all atoms, bonds and lone pairs in each structure in your mechanism. [Note: The chloride counterion is just a 'bystander' in this process.]



Name _____

6. (30 points)

(a) A hydrocarbon with the formula C_8H_{12} is exposed to excess H_2 in the presence of Pd/C as catalyst. TWO equivalents of H_2 are consumed, to generate a product with formula C_8H_{16} (this product does not react further with H_2 in the presence of Pd/C).

Propose THREE possible structures for the starting material C_8H_{12} (via appropriate drawings).

(b) A different hydrocarbon with the formula C_8H_{12} is exposed to excess H_2 in the presence of Pd/C as catalyst. ONE equivalent of H_2 is consumed, to generate a product with formula C_8H_{14} (this product does not react further with H_2 in the presence of Pd/C).

Propose THREE possible structures for the starting material C_8H_{12} (via appropriate drawings).

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Problem #	Score
1	/ 15
2	/ 14
3	/ 7
4	/ 20
5	/ 14
6	/ 30

Total: / 100

A Periodic Table of the Elements

Group numbers recommended by the IUPAC are in green.
Older group numbers are in red. (These are used in the text for calculating formal charge for the A-group elements.)
(Atomic weights in parentheses are for the isotope of longest life.)

The shaded elements will be encountered most frequently in the text.

Period	1	2	Transition elements										13	14	15	16	17	18
	1A	2A	3B	4B	5B	6B	7B	8B	8B	8B	1B	2B	3A	4A	5A	6A	7A	8A
1	1 H 1.00797																	2 He 4.0026
2	3 Li 6.941	4 Be 9.0122											5 B 10.811	6 C 12.011	7 N 14.007	8 O 15.999	9 F 18.998	10 Ne 20.180
3	11 Na 22.9898	12 Mg 24.305	3	4	5	6	7	8	9	10	11	12	13 Al 26.9815	14 Si 28.085	15 P 30.974	16 S 32.06	17 Cl 35.453	18 Ar 39.948
4	19 K 39.098	20 Ca 40.08	21 Sc 44.956	22 Ti 47.867	23 V 50.942	24 Cr 51.996	25 Mn 54.938	26 Fe 55.845	27 Co 58.933	28 Ni 58.693	29 Cu 63.546	30 Zn 65.38	31 Ga 69.723	32 Ge 72.61	33 As 74.922	34 Se 78.96	35 Br 79.904	36 Kr 83.80
5	37 Rb 85.468	38 Sr 87.62	39 Y 88.906	40 Zr 91.224	41 Nb 92.906	42 Mo 95.96	43 Tc (98)	44 Ru 101.07	45 Rh 102.91	46 Pd 106.42	47 Ag 107.87	48 Cd 112.41	49 In 114.82	50 Sn 118.71	51 Sb 121.76	52 Te 127.60	53 I 126.90	54 Xe 131.29
6	55 Cs 132.91	56 Ba 137.33	71 Lu 174.97	72 Hf 178.49	73 Ta 180.95	74 W 183.84	75 Re 186.21	76 Os 190.23	77 Ir 192.22	78 Pt 195.08	79 Au 196.97	80 Hg 200.59	81 Tl 204.38	82 Pb 207.2	83 Bi 208.98	84 Po (209)	85 At (210)	86 Rn (222)
7	87 Fr (223)	88 Ra (226)	103 Lr (262)	104 Rf (267)	105 Db (268)	106 Sg (271)	107 Bh (272)	108 Hs (270)	109 Mt (276)	110 Ds (281)	111 Rg (280)	112 Uub (285)	113 Uut (284)	114 Uuq (289)	115 Uup (288)	116 Uuh (293)	117 Uus	118 Uuo (294)

Lanthanides	57 La 138.91	58 Ce 140.12	59 Pr 140.91	60 Nd 144.24	61 Pm (145)	62 Sm 150.36	63 Eu 151.96	64 Gd 157.25	65 Tb 158.93	66 Dy 162.50	67 Ho 164.930	68 Er 167.26	69 Tm 168.934	70 Yb 173.06
Actinides	89 Ac (227)	90 Th 232.04	91 Pa 231.04	92 U 238.03	93 Np (237)	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (252)	100 Fm (257)	101 Md (258)	102 No (259)